

MICROEVOLUTION

- Change in gene pool of a population
- Change in relative frequency of alleles in population
- Evolution on smallest scale

CAUSES OF MICROEVOLUTION

Genetic Drift	<ul style="list-style-type: none">• Changes in gene pool of small population due to random chance• Bottleneck effect• Founder Effect
Gene Flow	<ul style="list-style-type: none">• Change in gene pool due to migration of fertile individuals or due to the transfer of gametes between populations
Mutation	<ul style="list-style-type: none">• Introduction of a new allele
Nonrandom mating	<ul style="list-style-type: none">• Mates not randomly chosen• Sexual selection
Natural Selection	<ul style="list-style-type: none">• Differential reproductive success• Some phenotypes selected against

QUESTIONS:

1. Use the key provided to identify the microevolution cause described in each of the following.

- | | |
|----------------------|----------------------|
| A. Bottleneck effect | D. Mutation |
| B. Founder effect | E. Nonrandom mating |
| C. Gene flow | F. Natural selection |

- _____ Changes in the gene pool of a small population due to random chance
- _____ Examples of genetic drift
- _____ Much of the population is wiped out by a natural disaster; the allele frequency of the population is determined by a small surviving population
- _____ A few individuals colonize a new habitat; genetic drift in a new colony
- _____ Change in the gene pool of a population due to the migration of fertile individuals or the transfer of gametes between populations
- _____ The introduction of new alleles
- _____ Mates not chosen randomly; sexual selection
- _____ Differential reproductive success; some phenotypes selected against; individuals best adapted to the environment survive to reproduce and pass their genes onto the next generation
- _____ The appearance of blue M&Ms in a population of red and green M&Ms
- _____ A few birds separate from the rest of the flock, fly to a new area, and establish a new colony
- _____ At the end of the last ice age, cheetahs almost became extinct – only a few survived.
- _____ Only a small number of flies survives a harsh winter.
- _____ Female flies prefer to mate with white-eyed males
- _____ Pollen from one field of seed corn is blown across the county to another field of seed corn.

2. Which of the factors above results in a random, nonadaptive change in allelic frequencies?

3. Which of the factors above tends to reduce the genetic differences between populations and make populations more similar?

4. Of the three factors listed above (A, B, or C), only one results in individuals that are better suited to their environment. Which is it? _____

5. What happens in each of these examples of genetic drift?

Founder effect _____

Bottleneck Effect _____

23.4

6. Is all variation within a population heritable? Explain.

7. The phenotypic expression of a trait is dependent upon 2 factors. List them.

8. Match the description / example with the correct term. Use the key provided to indicate your answers.

A. Polymorphism B. Geographical variation C. Cline

- _____ The height of asters decreases as the altitude on a mountainside increases
- _____ One species of king snakes exist in several different varieties with the population
- _____ ABO blood groups in humans
- _____ 2 or more morphs are present in a population in noticeable frequencies
- _____ Differences between populations in their frequencies of alleles
- _____ Presence or absence of freckles in humans
- _____ Subpopulations within a population
- _____ Could result from localized inbreeding in a "patchy" environment
- _____ Type of geographical variation that is a graded change in a trait along a geographic transect

5. What are the sources of genetic variation within a population?

6. Which source of genetic variation produces the greatest variety?

Explain why this is true. _____

7. If natural selection tends to reduce variation, then how is variation preserved within the population?

8. If sickle-cell anemia is so destructive, why hasn't the sickle-cell allele been eliminated from the population?

9. What are neutral variations? _____

How is the frequency of neutral alleles affected by natural selection?

10. Adaptive evolution is the blend of what two factors?

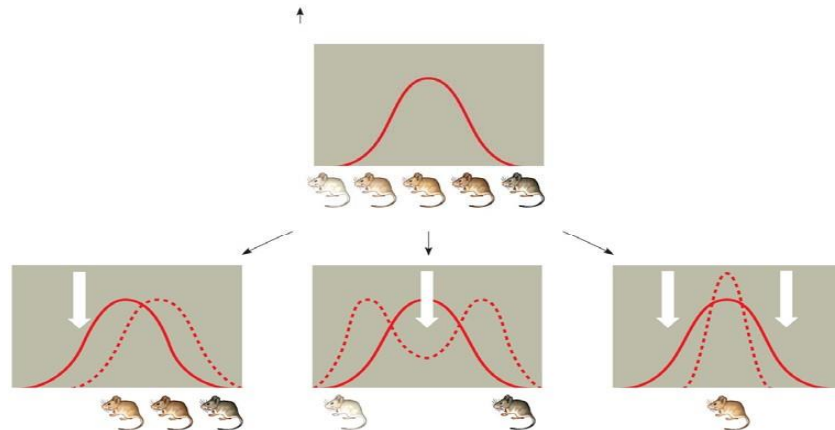
11. "Survival of the fittest" is defined in terms of reproductive success not just in terms of survival. Why?

12. Why does selection act faster against a harmful dominant allele than a harmful recessive allele?

13. Selection acts directly on _____ and indirectly on _____.

14. Explain why the connection between phenotype and genotype is not simple.

15. Figure 23.13 is important because it helps explain the three modes of selection. Label each type of selection, and fill in the chart to explain what is occurring.



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Type of Selection	How It Works
<i>Stabilizing</i>	
<i>Directional</i>	
<i>Disruptive</i>	

16. A. Stabilizing selection B. Directional selection
 C. Diversifying selection D. Sexual selection

- _____ acts against the extremes
- _____ favors both extremes
- _____ favors one of the extremes
- _____ favors the intermediate
- _____ reduces the intermediate
- _____ reduces phenotypic variation
- _____ females select males that are showier, more colorful, etc. for mating
- _____ a plant population is found in an area that is becoming more arid; the average surface area of the leaves had been decreasing over generations
- _____ female chickens prefer to mate with roosters with large, red combs

- _____ as the trees in central and southeastern England became covered with dark pollutants; the dark variety of the peppered moth became more abundant
- _____ Average-sized seeds become more common; the birds that eat the seeds become more specialized with around the same (average) size beak length
- _____ Larger seeds become more common; the bird population evolves larger beaks
- _____ Average-sized seeds become less common and larger and smaller seeds become more common; the bird population splits into 2 subgroups specializing in eating larger and smaller seeds.
- _____ Human infants have the best chance of surviving the trials of birth if they weigh between 7 and 8 pounds at birth; mortality is higher at higher or lower birth weights.

17. What is sexual selection? _____

Why are sexual adaptations often at odds with other adaptations?

18. What is the difference between *intrasexual* and *intersexual* selection?

19. Explain two ways in which genetic variation is preserved in a population.

20. Discuss what is meant by *heterozygote advantage*, and use sickle-cell anemia as an example. _____

21. Why doesn't evolution produce perfect organisms? (4 reasons)

End of Chapter Synthesis and Evaluation Problems

1. Answer question 9 (pg 487)

***Question #9 should be typed out, then answered in no more and no less than 100 to 150 words. Turn in separately to the tray. This is worth **20 points!** Do not plagiarize. Use your own words and thoughts...but, use vocabulary terms and ideas taught in this chapter!

Study Guide/ISN (20 points)

In your study guide book, review pages 157 to 159. In your ISN, title a page as follows: **Chapter 23 Evolution of Populations Must Know!** In one color, copy down must know items listed below leaving space underneath to include in an different color a brief description, diagram, model, or pneumatic device that will help you study for the unit test and more importantly the AP Test in May.

Must Knows:

- The three major factors that alter allele frequencies and bring about most evolutionary change.
- Two kinds of genetic drift and examples
- Difference between relative fitness and natural selection
- Frequency distribution of heritable traits
- How genetic variation is preserved in a population.

Bozeman Science/ AP Biology/ISN (See Syllabus for format) (20 points each)

1. Population Variation (Big Idea 4)
2. Stickleback Evolution (Supplemental AP Bio Resources)
3. Evolution Continues (Big Idea 1)